

REMARKS

The outstanding Office Action makes the following rejections, all of which are based on 35 U.S.C. 103: claims 1, 5, 6, 10-12, 16, 18 and 20 over Gruenwald in view of Mikeska; claim 7 over Gruenwald in view of Mikeska and Branchevsky; claims 8, 9, 13-15 and 17 over Gruenwald in view of Mikeska and JP '150; and claim 19 over Gruenwald in view of Mikeska and either Kodama or IBM Technical Disclosure Bulletin. All of these rejections are respectfully traversed.

Claim 1 is the only independent claim in this case and all of the other claims are dependent, directly or indirectly, on that claim. Claim 1 is directed to a manufacturing method in which an unsintered composite laminate is provided and then fired at a temperature at which the green layers in the laminate are sintered. The provided laminate is composed of a plurality of green layers, a restriction layer which does not sinter at the sintering temperature of the green layers arranged to contact a primary surface of at least one of the green layers, at least one wiring conductor associated with a green layer and a sintered plate of a fired first ceramic functional material which is different from the ceramic functional material of the green layers. The sintered plate has an area smaller than the area of the primary face of the green layer on which it is arranged, a thickness which is less than the thickness of the green layers, and the sintered plate is disposed between the primary faces of a pair of adjacent green layers.

The Applicants have previously pointed out that a feature of the invention which is not taught nor suggested in Gruenwald, and which is not remedied by the secondary references, is the disposition of the sintered plate "between" the primary faces of the green layers which are in substantially parallel planes. The Examiner has disagreed stating that in Gruenwald, a laminate is formed having a fired capacitor between adjacent green sheets and this is essential no different from that formed in the

Applicants' embodiment of Figures 1-4 and the capacitor no more forms the surface of a green sheet then Applicants' embedded capacitor forms a surface of a green layer in Figure 4. Applicants respectfully disagree and request the Examiner to reconsider his position in light of the following comments.

The method disclosed by Gruenwald involves first arranging a capacitor on a carrier 10 as shown in Figure 1 of that patent. This is produced by first screen printing an electrode 1 on carrier 10, applying a dielectric paste on the electrode, printing electrode 2 on the dielectric paste and firing the resulting structure. Alternatively, a ceramic lamina which has already been fired can be used and the second electrode 2 is printed on the fired dielectric. This procedure is described at the top of column 2. However, the method in which the dielectric 3 is green is preferred for the reasons set forth at column 2, lines 43-51. Next, the capacitor on the carrier is pressed into a green ceramic sheet 11 which has been placed on a retaining mount 12 as shown in Figure 2. After pressing the carrier 10 and retaining mount 12 are removed, resulting in the configuration shown in Figure 3. Note that there is no teaching or suggestion in this reference that the ceramic of dielectric 3 and the ceramic of green sheet 11 are different.

The primary faces of the ply of Figure 3 are the top and bottom surfaces. The top surface is made up of portions of the green ceramic sheet 11, electrodes 1 and 2 and dielectric 3. A further ceramic green sheet 13 is placed on the primary surface of the ply of Figure 3. It will be appreciated that at no time when there are two adjacent green ceramic sheets, is dielectric 3 above the surface of green ceramic layer 11, as it must be in order to meet the requirement of the instant claim that the sintered plate be "between primary faces of a pair of adjacent green layers...which are in substantially parallel planes".

In contrast to the procedure of Gruenwald where the capacitor is placed on a green ceramic sheet and pressed into its surface before another green sheet is

laminated, the present invention places a capacitor element "on the ceramic green sheet" (page 9, lines 13-14), other green sheets are placed on top and the resulting laminate is pressed in the direction of lamination (page 10, lines 8-9). Note that Figure 4 in the present application shows the condition after pressing. In Gruenwald, the only time the capacitor is "between" structures is when it is between green sheet 11 and carrier 10 as shown in Figure 2 of the patent.

The secondary references do not cure the deficiencies of Gruenwald. Mikeska has been cited to show the use of a restriction layer, another feature of the invention which is lacking in Gruenwald. However, the restraining layers in Mikeska are used in connection with a structure in which all of the layers are the same green ceramic material. There is no teaching or suggestion that the restraining layers be used in conjunction with a structure which contains both green and sintered material. There is nothing in Mikeska which would suggest to one skilled in the art that a restriction layer can be used where one material shrinks at one rate and another material does not shrink. Since green dielectric shrinks to form the fired dielectric, Gruenwald's dielectric has different shrinkage characteristics if it is in paste form rather than fired form. In Gruenwald's procedure with a dielectric previously fired, the fact that the multiple ceramic layers 11 and 13 are not restrained allows them to compensate for the different shrinkage characteristics of the green ceramic and the fired ceramic. Using a restriction layer does not permit this compensation and therefore it is respectfully submitted that whenever a restriction layer is used, one skilled in the art would not employ a fired plate in the material restricted. Accordingly, it is respectfully submitted that any proper combination of Mikeska and Gruenwald would require employment of the Gruenwald embodiment in which the dielectric 3 is in green form prior to firing.


The Branchevsky reference has been cited only with regard to claim 7 and to show a multilayer capacitor. It has not been cited to eliminate any of the discussed deficiencies in Gruenwald or Mikeska nor in fact does it do so.

JP '150 has been cited to show a ceramic multilayer substrate with a capacitor arranged between layers where the dimensions or firing temperature are those set forth in claims 8, 9, 13-15 and 17. Kodama has been cited to show there can be multiple capacitors and the IBM Technical Disclosure Bulletin to show that resistors and capacitors can be built into an MLC substrate. These references, like Branchevsky, are not asserted to cure any of the discussed deficiencies in Gruenwald and Mikeska and in fact they do not do so.

In light of all of the foregoing considerations, it is respectfully submitted that all of the rejections should be withdrawn and that this case is now in condition to be allowed. Accordingly, the early issuance of a Notice of Allowance is respectfully requested.

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Respectfully submitted,

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